Samsung Satellite
Set-Top Box for VIASAT

DSB - H670N

Product Requirements
H/W Specification

V.1.0.4

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1 Introduction

1.1 Purpose

This document describes the system level requirements for satellite HD set-top box for VIASAT

1.2 Document History

The following table describes the document history.

Date	Author	Description
2007-01-23	Jaden Lim	v1.0.0
2007-01-29	Jaden Lim	v1.0.1
2007-01-31	Jaden Lim	V1.0.2
2007-02-07	Jaden Lim	V1.0.3
2007-02-15	Jaden Lim	V1.0.4

Table 1 - Document history

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1.3 Abbreviations

Listed below are the technical terms and abbreviations used in this specification.

Abbreviation	Definition
BAT	Bouquet Association Table
CA	Conditional Access
CAT	Conditional Access Table
DVB	Digital Video Broadcasting
EIT	Event Information Table
EPG	Electronic Program Guide
GMT	Greenwich Mean Time
LNB	Low Noise Block down converter
NIT	Network Information Table
OSD	On Screen Display
OTA	Over-The-Air (Software upgrade)
PAT	Program Association Table
PMT	Program Map Table
PSI	Program Specific Information
QPSK	Quadrature Phase Shift Keying
RCU	Remote Control Unit
SDT	Service Description Table
SI	Service Interface
STB	Set-Top-Box
TDT	Time & Date Table
TOT	Time Offset Table
TS	Transport Stream
UI	User Interface
8PSK	8(Octal phase shift keying)
HD	High Definition
HDMI	High Definition Multimedia Interface
DVB-S2	2nd Generation of DVB-S(Digital Video Broadcasting-Satellite)
HDCP	High-bandwidth Digital Content Protection

Table 2 - Definitions, Acronyms and Abbreviations

1.4 Notation Convention

The following table describes the notation conventionally used in this document.

Verbal form of requirement	Meaning
Shall	Mandatory
Should	Optional

Table 3 – Notational Convention

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1.5 References

[1] ETSI TS 102 006 v1.3.1, Specification for System Software Update in DVB Systems.

[2] ETSI EN 300 468 v1.3.1, Specification for Service Information (SI) in DVB systems and specific descriptor's the latest standard.

[3] ETSI EN 300 472 v1.2.2, Specification for conveying ITU-R System B Teletext in DVB bitstreams.

1.6 Trademarks

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2 General STB Requirements

This document describes requirements for HD satellite STB for VIASAT operator. The model name is DSB-H670N. In further part of this document it will be called STB.

This STB shall support NDS Mediahighway Core with a Shim Layer HDI to CDI

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3 CDI

STB shall support CDI profile same with Metro Platform collaborating with NDS - To be confirmed by NDS

Samsung will be responsible for Harmonizer test and CDI release to NDS.
Latest CDI version is M2.65 for BRCM7401C1

Broadcom CDI schedule is as below

Milestone	Task	End Date
M1	Zapper release with CA (Port NDS CDI on 7401)	25. Aug 2006
M2	IP STB release (Chunk Input)	26. Sep 2006
M2.5	Dual Chunk Input supporting IP STB for B0	23. Dec 2006
M2.5	Dual Chunk Input supporting IP STB for C1	10. Jan 2007
M2.6	Bug fix	19. Jan 2007
M2.65	Bug fix	25. Jan 2007
M2.7	Bug fix	09. Feb 2007
M3	PVR Release (Port XTV CDI)	2. Mar 2007

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4 Hardware Requirements

This chapter describes basic requirements for STB hardware.
General hardware functionality of the STB shall include:

1. MPEG chip (HD H.264): BRCM 7402C1
2. 256MB DDRAM
3. 32MB Flash (NOR), 32Kbytes NVRAM
4. Video Output PAL by two SCART (TV and VCR)
5. S/PDIF Output (optical interface)
6. One smart card slot
7. HDMI1.1 with HDCP
8. 1X Satellite tuner
9. DVB-S/S2 demodulation
10. SATCR support
11. Basic control buttons (power/stand-by, channel up/down, TV/Radio)
12. Audio output on HDMI & SPDIF:

4.1 Front panel

.

Dimension: 270mm(W) x 40mm(H) x 200mm(D)

Figure 1 – STB Front Panel

- CH Up/Down, TV/Radio , Power On/Off
- 1 Blue LED for Power On / Off (Standby : On)

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4.2 Rear Panel

The following outputs will be supported:

- Fixed power cord
- LNB input, F type connector
- Two SCART connectors (TV and VCR), RGB supported on both SCARTs
- HDMI1.1 with HDCP
- Optical connector(S/PDIF)
- 2x USB2.0 Port on Rear Panel
- 1x Ethernet

4.3 Security

Hardware will comply with NDS ICAM

4.4 Smart Card Reader

The receiver will be equipped with an ISO 7816-1,2,3 compatible smartcard reader for the NDS ICAM system.

- The physical characteristics of the smartcard connector and holder will be in accordance with ISO 7816-1 "Identification Cards - IC cards with contacts. Part 1: Physical Characteristics".
- The smartcard pin-out and electrical connections will be in accordance with ISO 7816-2 "Identification Cards - IC cards with contacts. Part 2: Dimensions and Location of the Contacts".

4.5 Front-End

The tuner support the full 1-45 MBaud DVB-S/S2 operating range and L-Band RF input frequencies from 950MHz to 2150MHz , the baseband IQ analog waveforms from the tuner sections are sampled by-bit A/D converter and processed by a variable rate demodulator followed by a 24-tap equalizer and compliance with DiSEqC2.x for communication with LNB and I2C protocol is used to control the frequency and LNB.

.

Input frequency range	950-2150MHz
Input impedance	75 Ω
Connector type	F-type female (IEC 169-24)
Input level sensitivity	–65 dBm to -25 dBm (per carrier)
A/D converters	8 bit per channel (at baseband IQ signal)
Channel selection	PLL frequency synthesizer (I2C)
DiSEqC	2.X
Data output mode	Serial / Parallel
Debugging methods	UART for RS232, JTAG

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8-bit A/D converters digitize the I and Q output of the tuner for processing by the digital demodulator at a programmable sample rate of up to 135MHz
The AGC loop examines the power of the digitized signal and compare it to a programmable loading factor
The I/Q imbalance correction loop compensates for quadrature imbalance introduced by the direct conversion tuner.
Variable rate digital filters and matched filters will reduce demodulation error

4.6 Demodulation

< DVB-S >

Demodulation:	QPSK according to ETS 300.421
Code rates	1/2, 2/3, 3/4, 5/6, 7/8
Outer FEC:	Reed Solomon coding (204, 188)
Symbol Rate	1 to 45 MBaud

< DVB-S2 >

Demodulation:	8PSK/QPSK according to ETS 302.307
Code Rates:	1/2, 3/5, 2/3,3/4, 5/6, 8/9,9/10 at QPSK 3/5,2/3,3/4,5/6,8/9,9/10 at 8PSK
Outer FEC:	BCH
Symbol Rate	10 to 30 MBaud

4.7 Decoding

Demultiplexing	ISO/IEC 13818-1
Video data rate	ISO/IEC 13818-2 Max data rate of 15 Mbits/s
Audio data rate	Enhance 192 kbits/s into 448 kbits/s
Video decoding	ISO/IEC 13818-2 MP@ML ISO/IEC 14496-10 H.264/AVC MP@L4 ISO/IEC 14496-10 H.264/AVC HP@L4
Video resolution	1920X1080i, 1280X720p, 720X576p, 720X576i
Audio decoding	MPEG-1 ISO/IEC 11172-3 Layer 1 and 2, Dolby digital, Dolby digital plus, AAC 5.1, AAC+level2 and AAC+level4

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4.8 Video Output

- On SCART connectors only SD resolution regardless the HDMI resolution mode.
- HD outputs: HDMI with HDCP (with resolution up to 1080i.)
- Compatibility with Dolby Digital & Dolby Digital + down mix

Video Type:	PAL System;
Resolution:	1920X1080i, 1280X720p, 720X576p, 720X576i
Format:	4:3 and 16:9 (pan-scan), wide-screen (letterbox)
Frequency response:	25Hz-5MHz
Composite Level:	1Vpp in 75 ohm
Connector:	2 SCART (TV and VCR) with 576p or 576i resolution HDMI1.1 with HDCP1.1
S/N ratio:	>65 dB (weighted)
Teletext:	Reinsertion in VBI

4.9 Audio Output

- Separate selection of audio string on SPDIF/ HDMI - (SPDIF in stereo, HDMI in 5.1) - enabling to connect video through HDMI and audio with SPDIF in stereo

Number of Channels:	2 standard (L&R)
Output level:	2Vrms into 47kΩ max
Output connector:	SCART (TV and VCR) down mix 5.1 ch HDMI with 5.1 S/PDIF (optical) with 5.1
Frequency response:	20Hz to 20kHz +/- 1 dB
Total Harmonic Distortion:	< 0.8 % at 1 kHz
Left/right balance:	< 1 dB
S/N ratio:	> 70 dB
Sampling frequencies:	32.0, 44.1 and 48.0 kHz

4.10 System

Microprocessor type:	BRCM7402C1
Memory:	32MB Flash 256MB DDR SDRAM 32KB EEPROM

4.11 Data Communication Port

RS-232 port:
It is located inside STB box with pins of GND, TXD and RXD.

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4.12 RCU (Remote Control Unit)

STB shall be compatible with RCMM protocol of UEI RCU.

Figure 1 – UEI RCU

4.13 Ethernet

The STB shall have 1 Ethernet port which can interface with 10/100 Ethernet transceiver and receiver

- 802.2u compliant transmit and receiver engines
- Separate transmit and receive FIFOs with programmable watermarks
- Full-duplex and Half-duplex Operation
- Full-duplex fram-based flow control compliant with 802.3x
- Automatic CRC checking and generation

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4.14 USB2.0

The STB shall have 2X USB2.0 type ‘A’ receptacle ports on the rear panel.
The purpose of this port is to provide external connectivity to peripheral devices, including the support of external Hard Drives to extend the recording capability of the system.

- All USB interfaces and functionality shall be compliant with the USB 2.0 specification
- Both ports shall operate independently of one another.
- Both interfaces shall be capable of operation at slow, full and high (480Mbits/s) peed rates as defined in the USB2.0 specification.
- Both ports shall be capable of supplying 500mA (Full Power mode)

The STB shall be protected as far as possible against accidental insertion or removal of a USB device whilst the STB is powered.

4.15 Accessory

The STB shall be supplied with the following accessories:

Standard:

- 1 Scart cable
- 1.5 m Mains power cable with non-grounded plug
- 1.5 m HDMI cable
- 1 User manual 5 languages

4.16 Power Supply

Input voltage:	220-240 VAC, 35W power rating. Fixed power cord
Input frequency:	50/60Hz
Protection:	Internally fused, low voltage brown-out protection

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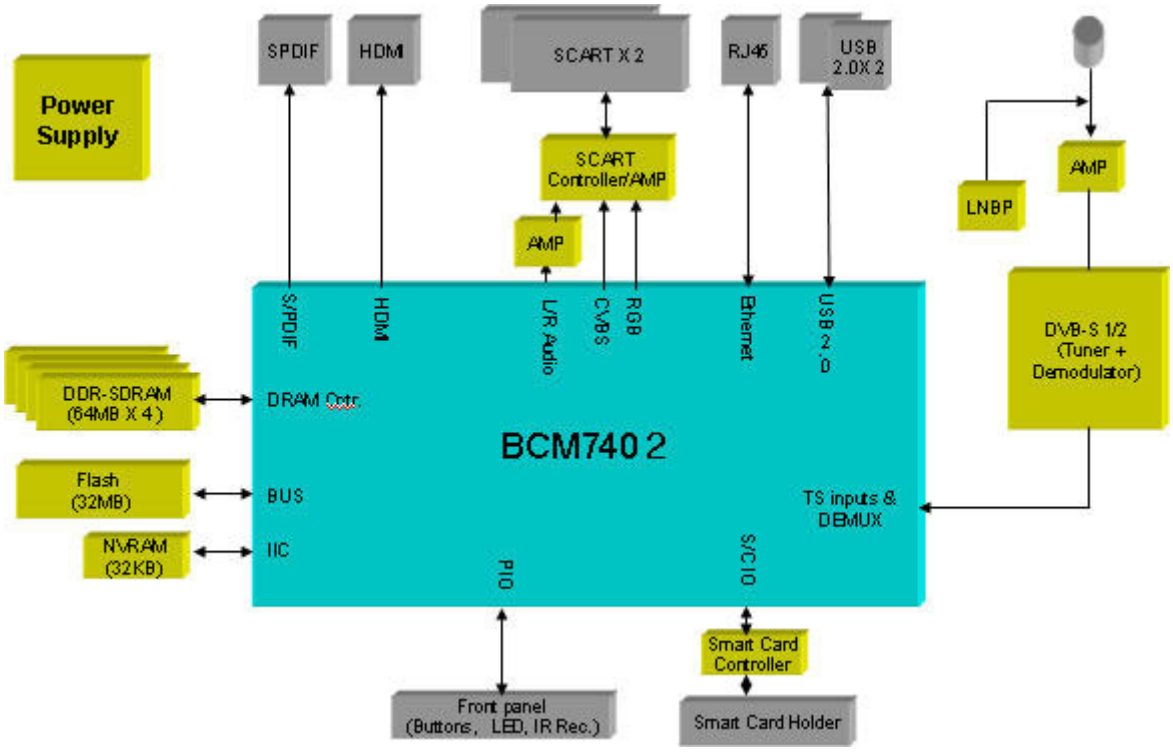
4.17 Block diagram

Figure 2 – Block Diagram



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